KHROUS GROUP

Khronos and the OpenCL Standard

Neil Trevett Khronos Group President OpenCL Working Group Chair NVIDIA Vice President

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Who is the Khronos Group?

- Industry consortium creating open API standards
 - By the industry, for the industry founded nine years ago any company welcome to join
- Enabling software to leverage silicon
 - Low-level graphics, media and compute acceleration APIs
- Strong commercial focus
 - Enabling members and the wider industry to grow market opportunities

Commitment to royalty-free standards

- Making money from enabled products - not from the standards themselves







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Processor Parallelism





OpenCL Commercial Objectives

Grow the market for parallel computing

- Royalty-free, open standard for vendors of systems, silicon, middleware, tools and applications

Enable developers to easily exploit parallel computation

- Unified programming model for CPUs, GPUs, Cell, DSP and other processors in a system
- Achieve dramatic speedups for computationally intensive applications

Support a diversity of applications

- From embedded and mobile software through consumer applications to HPC solutions

Provide wide application portability

- HPC servers, desktop systems and handheld devices

Create a foundation layer for a parallel computing ecosystem

- Close-to-the-metal interface to encourage middleware and applications

Rapid market deployment

- OpenCL 1.0 designed to run on *current* generations of GPU hardware for fast roll-out
- THEN expand specification to inspire future silicon capabilities

OpenCL Working Group

- Diverse industry participation
 - Processor vendors, system OEMs, middleware vendors, application developers
- Many industry-leading experts involved in OpenCL's design
 - A healthy diversity of industry perspectives
- Apple made initial proposal and is very active in the working group
 - Serving as specification editor



OpenCL 1.0 Embedded Profile

- Will enable OpenCL on mobile and embedded silicon
 - Relaxes some data type and precision requirements
 - Avoids the need for a separate "ES" specification
- Khronos mobile API ecosystem defines mixed compute, imaging/ graphics
 - Enabling advanced applications e.g. augmented reality
- OpenCL will enable parallel computing in new market areas

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- E.g. mobile phones, automotive, avionics



A GPS phone processes images to recognize buildings and landmarks and uses the internet to supply relevant data

OpenCL / OpenGL Interoperability

OpenCL can efficiently share resources with OpenGL

- Applications use the APIs that best fit their problem domain

Data is shared, not copied

- Textures, Buffer Objects and Renderbuffers

Applications can select compute device(s) to run OpenGL and OpenCL

- Efficient queuing of OpenCL and OpenGL commands into the hardware
- Flexible scheduling and synchronization
- Works on single GPU and multi-GPU systems

OpenCL objects are created from OpenGL objects

- clCreateFromGLBuffer(), clCreateFromGLTexture2D(), clCreateFromGLRenderbuffer()



The Khronos API Ecosystem



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OpenCL Timeline

• Six months from proposal to released OpenCL 1.0 specification

- Due to a strong initial proposal and a shared commercial incentive to work quickly

Apple's Mac OS X Snow Leopard will include OpenCL

- Improving speed and responsiveness for a wide spectrum of applications



OpenCL Resources

OpenCL Registry

- www.khronos.org/registry/cl/

OpenCL Reference Card

- PDF version www.khronos.org/files/opencl-quick-reference-card.pdf
- Pick up your physical copy today!
- Man pages coming soon!

OpenCL Developer Forums

- www.khronos.org/message_boards/
- Give us your feedback!

Extensive Conformance Test Suite

- Full source access for small fee
- Peer review of results by OpenCL working group
- Passing implementations licensed to use the OpenCL trademark

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The Industry Impact of OpenCL

• For software developers

- Royalty free API for writing parallel programs that will run on many devices
- A wider choice of parallel compute tools, libraries and middleware

For silicon vendors and OEMs

- A wide range of software and tools to drive hardware demand
- OpenCL Conformance Test Suite available

• .. and most importantly - end-users will benefit

- A wide range of innovative parallel computing applications
- If this is relevant to your company please join Khronos and get involved!

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